National Climatic Data Center

DATA DOCUMENTATION

FOR

DATASET 6420j (DSI-6420j)
NOAA Research Flight Data (AOC)

DATASET WP-3D NOAA-43 OCEAN WINDS EXPERIMENT 2003

July 3, 2006

National Climatic Data Center
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1. **Abstract**

NOAA's Aircraft Operations Center (AOC) maintains and operates two WP-3D aircraft for weather research projects throughout the year. Examples of these projects are hurricanes, thunderstorms, atmospheric chemistry and winter weather missions. Each of these projects consists of a series of individual flights. For instance, during hurricane projects the WP-3D may fly a variety of missions through tropical cyclones.

The real-time flight-level data is collected and written to a digital data tape on the aircraft and afterwards converted to a file for faster processing and archiving. For each archived project, there are multiple directories consisting of individual flights. The data in these flight directories contain real-time measurements obtained from sensors located throughout the aircraft's interior and exterior. Also included in a flight directory are scanned images of the actual flight manifest, the navigation log and the mission observation log.

2. **Element Names and Definitions**

A data record contains 220 elements, stored as 16 bit integer words, and must undergo a conversion process to be displayed as engineering units (degrees, millibars, etc). All of the navigation data is stored as two16 bit integer words that can only be discerned through special bit shifting operations. If examination of the navigation data is desired, contact AOC for a copy of the bit shifting software.

The flight-level data file contains measurements at one-second intervals. These include time in UTC (Z), Global Positioning System (GPS) and inertial navigation data, altitudes, and a variety of temperature and pressure observations. Depending on the scientific objectives of a project, instrumentation will either be included or excluded from this list.

NOAA-43 Aircraft N43RF Ocean Winds Experiment 2003

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Array
 Location      Description
 ----------------------------------------------------------------------
*
  1            Setup      MS Byte - Slow tape ID, LS Byte - Acft #
  2            Setup      size of slow tape logical record == 220 words
3-8            Setup      Micro 99 time - yr,mo,da,hr,mn,sc; updated by fast
9-11           Fast       TBG 1 time - hr,min,sec; binary (not BCD)
12-14          Fast       TBG 2 time -same as TBG 1
15-17          GPS_Time Fast 3M GPS Time of fix - hr,min,sec; same as TBG's
18-19          GPS_Dat  Fast  3M GPS Altitude - MS bit = -102400*32 ft
20-21          Fast       3M GPS Latitude - MS bit = -PI*4 radians
22-23          Fast       3M GPS Longitude - MS bit = -PI*4 radians
24-25          Fast       3M GPS North Vel. - MS bit = -1638.4*2 knots
26-27          Fast       3M GPS East Vel. - MS bit = -1638.4*2 knots
28-29          Fast       3M GPS Vert. Vel. - MS bit = -2048*2 ft/sec
30             Fast       BR2G GPS Data Time; 0 to 36000, lsb = 1/100 sec
31             Fast       BR2G GPS Altitude; +/- 32767, lsb = 1 ft
32-33          Fast       BR2G GPS Latitude; msb = -PI*4 radians
34-35          Fast       BR2G GPS Longitude; msb = -PI*4 radians
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36              Fast         BR2G GPS Horiz & Vert  Dilution of Precision
                               ms byte – HDOP 00 to 99 ls byte – VDOP 00 to 99
37              Fast         BR2G GPS Status and Position Dilution of Precision
                               bits 15,14: 00 – no position, 01 – uncorrected,
                                           10 – diff corrected, 11 – almanac used
                                   bits 13-8: # of satellites used
                                   ls byte – HDOP 00 to 99
38              Fast         3M GPS North Accel. – MS bit = -128 m/s**2
39              Fast         3M GPS East Accel. – MS bit = -128 m/s**s
40              Fast         3M GPS Vert. Accel. – MS bit = -128 m/s**2
41              Fast         3M GPS Chan 1 Status 1 \ See Rcvr 3M Spec. for
42              Fast         3M GPS Chan 1 Status 2 /  bit assignments
43-50           Fast         3M GPS Chan 2-5 Status – same format as Chan 1
51              Fast         3M GPS Figure of Merit word – See Rcvr 3M spec.
                               Note: Time FOM from word 64 is in reserved bits
                               (12,11,5,4 in HP notation; 3,4,10,11 in 3M/DEC)
52              Fast         3M GPS expected horiz. error – LS bit = 1 meter
53              Fast         3M GPS expected vert. error – LS bit = 1 meter
54                   Spare
55-56           Fast         INE 1 Altitude – MS bit = -102400*32 ft
57-58           Fast         INE 1 Latitude – MS bit = -PI*4 radians
59-60           Fast         INE 1 Longitude – MS bit = -PI*4 radians
61-62           Fast         INE 1 North Vel. – MS bit = -1638.4*2 knots
 63-64           Fast         INE 1 East Vel. – MS bit = -1638.4*2 knots
65-66           Fast         INE 1 Vert. Speed – MS bit = -2048*2 ft/sec
67-68           Fast         INE 1 Drift Angle – MS bit = -PI*4 radians
69-70           Fast         INE 1 Heading – MS bit = -PI*4 radians
71-72           Fast         INE 1 Pitch Angle – MS bit = -PI*4 radians
73-74           Fast         INE 1 Roll Angle – MS bit = -PI*4 radians
75-94           Fast         INE 2 Data – same as INE 1
95              Fast         APN-232 RA Data in meters; 1 sec avg
96              Fast         Spare; 1 sec avg
97              Fast         Spare; 1 sec avg
98              Fast         APN-159 RA synchro data in meters; 1 sec avg
99              Fast         APN-159 RA parallel encoder data in meters
100   INEflg    Fast         # of INE bursts avg'd this sec; ms byte – INE #1
                                    ls byte – INE #2
101   GPSflg    Fast         GPS & APN232 RA burst count;
                                    bits 15-12: Ashtech BR2G GPS # of bursts
                                    bits 11-8 : Collins 3M GPS # of bursts
                                    bits 7-0  : APN232 RA # of words avg'd this
sec
102   GarFlg    Fast         # of ISEC word 96 & 97 samples avg'd this sec;
                                    ms byte – ISEC(96), ls byte – ISEC(97)
103  Dig_Err  Fast         Error flags for Dig. Avg.; bit 0 for APN232, etc.
104               Spare
105  ADCstatus ASSRV      ADC unit status – from ADC slow data burst
106  IAUstatus Fast       IAU unit status – from IAU burst
107  OperSel   Slow       Operator selections: ms nybl – temp probe,
                                    nybl 2 – nav. unit, nybl 3 – Alt. source
                                    ls nybl – dewpoint unit
108              Fast       status from Wing Wiring Junction Box
109              Fast       status from Cloud Physics Station
110              Fast       status from Flight Director Station
111              Fast       spare
112              Fast       event switch data – Nav,Sta1,Sta2,Sta3
113              Fast       event switch data – Nrack,Sta5,C3X,Sta7
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114            Fast       event switch data - F/D,Pilot
115            Fast        spare
116            Fast       spare
117            Fast       Formvar count
118            Fast       Formvar speed
119            Fast        spare
120-138
139            Fast       M99 10 mSec tic when time was read - use for clock
                               drift tracking

140            J-W Liquid water
141            RMST TOTAL TEMP #1
142            RMST TOTAL TEMP #2
143            Dew Point 1 (DW1)  GENERAL EASTERN
144            AP Alpha (attack) Pressure
145            DAP Differential Alpha Pressure
146            BP Beta (slip) Pressure
147            DBP Differential Beta (slip) pressure
148            PSW Rosemount static pressure from wingtip(#1281)
149            PQW Rosemount dynamic pressure from win#tip(#1281)
150            RD  Radiometer Down measures SST (PRT-5)
151
152            RS  Side (CO2) radiometer temperature
153
154            Vertical Acceleration 2
155            Vertical Acceleration 1
156            RADOME ATTACK PRESSURE
157            RADOME SIDESLIP PRESSURE
158            RADOME DIFF. PRESSURE (RPQ)
159            RADOME IMPACT PRESSURE
160            Total Temp #3 (fast response) Port side
161-163   Spare
164            DEWPOINT #2 (DW2) EDGETECH
165            Spare
166            Lyman Alpha Hygrometer
167            Dewpoint # 3 TDL
168            Dewpoint # 3 Balance
169            Spare
170            Spare
171            King Liquid water
172            PSF - COPILOT ROSEMOUNT #1281 (FUSELAGE)
173            PQF1 - COPILOT ROSEMOUNT #1281 (FUSELAGE)
174            PQF2 - COPILOT ROSEMOUNT  1221F(FUSELAGE)
175            TT1 Heater Current
176            TT2 Heater Current
177            Spare
178            Spare
179            Spare
180            Spare
181            Spare
182            Spare
183            Spare
184            Spare
185            Spare
186            Spare
187            Cabin Pressure Vaisala
188-219   Spare
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220   Checksum for this second

3. Start Date

20030215

4. Stop Date

20030316

5. Coverage

a. Southernmost Latitude: 35 N (or S)
b. Northernmost Latitude: 60 N (or S)
c. Westernmost Longitude: -165 W (or E)
d. Easternmost Longitude: -082 W (or E)

6. How to Order Data

Ask NCDC's Climate Services about costs of obtaining this dataset.
Phone 828-271-4800
Fax   828-271-4876
e-mail- orders@ncdc.noaa.gov

7. Archiving Data Centers

Name : National Climatic Data Center/NCDC
Address: Federal Building
         151 Patton Ave.
         Asheville, NC 28801-5001
Voice Telephone: 828-271-4800

Name: Aircraft Operations Center
Address: Science and Engineering Division
         P.O. Box 6829
         MacDill AFB, FL 33608-0829
Voice Telephone: 813-828-3310
Fax: 813-828-5061

8. Technical Contact

Flight Director's Name: Martin Mayeaux, Paul Flaherty
Address: Aircraft Operations Center
         P.O. Box 6828
         MacDill AFB, FL 33608-0829
Voice Telephone: 813-828-3310
Fax: 813-828-5061

NIMBUS Software to read ADS File
http://www.atd.ucar.edu/atd/instruments/raf/ads
Chris Webster
cjw@ucar.edu

9. Known Uncorrected Problems

10. Quality Statement:

Disclaimer: This data is the raw flight-level weather data that has not been quality controlled for sensor contamination or other instrument related errors.

11. References:

Merceret, F.J., and Davis, H.W., 1981: The Determination of Navigational and Meteorological Variables Measured by NOAA/RFC WP3D Aircraft.